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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/393,463	09/10/1999	WILLIAM S. WOODS	899.009US1	2759

21186 7590 11/01/2007
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ART UNIT	PAPER NUMBER
2615	

MAIL DATE	DELIVERY MODE
11/01/2007	PAPER

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

MAILED

NOV 0 1 2007

Technology Center 2600

Application Number: 09/393,463
Filing Date: September 10, 1999
Appellant(s): WOODS, WILLIAM S.

David R. Cochran
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 07-17-2007 appealing from the Office action mailed 01-22-2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is incomplete. The status of claim 35 was not addressed. While the status of claim 36 was not addressed, it appears to be part the present appeal, from appellant's statement in the last paragraph. Consistent with the final Office action, the examiner's answer considers claim 35 as objected to and claim 36 as rejected.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

Miller et al	(US PAT. 5,506,910)	04-09-1996
Seki et al.	(US PAT. 5,677,987)	10-14-1997
Finn et al.	(US PAT. 6,496,581)	12-17-2007
Kandel et al.	(US PAT. 6,353,671)	03-05-2002
Stott et al.	(US 2002/0044667)	04-18-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

1. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6353671 to Kandel (hereafter as Kandel).

Regarding Claim 1, Kandel discloses a method of processing audio signals (i.e. signal processing circuit and method for increasing speech intelligibility), comprising inhibiting at least one feedback component of an input audio signal by adjusting (such

as, by processing filter 120 accurate the input signal (T tong signal plus audio signal) from microphone 118 and output to mixer 113, when the tong signal is changed) a feedback-inhibiting filter (120 in Fig. 4; column 5, line 57 to column 6, line 5; column 9, lines 50-57) using a narrowband subaudible probe signal (reads on the T tong signal, in Fig. 4; column 6, lines 19-24; column 10, lines 12-25; column 12, lines 1- 4).

2. Claims 1-2, 5-15, 17, 18, 20, 22, 25, 28, 29, 34, 36 and 40 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5506910 to Miller et al (hereafter as Miller).

Regarding Claim 1, Miller discloses a method of processing audio signals, comprising inhibiting at least one feedback component of an input audio signal by adjusting a feedback-inhibiting filter (62 in Fig. 3; column 7, lines 9-19) using a narrowband subaudible probe signal ((f_i , f_j, f_k , testing signal) in Fig. 1 and see figs 7-11; column 4, line 64 to column 5, line 35, abstract).

Regarding Claim 2, Miller discloses a method of processing at least one audio signal comprising: filtering a processed signal by a notch filter to form a filtered Signal (21 in Fig. 1; column 4, lines 47-63); and sending a subaudible narrowband signal ((f_i , f_j, f_k) in Fig. 1) having a first bandwidth into the filter signal to form a probe signal ((f_i , f_j, f_k) in Fig. 1, (testing signal)) to probe a feedback path (between 60 and 36 in fig. 3) having a second bandwidth (Figs. 1, 3 and 7-11; column 4, line 64 to column 5, line 35 and column 7, lines 9-19).

Regarding Claim 5, Miller discloses sending the subaudible narrowband signal comprises sending the subaudible narrowband signal having a level, wherein the level of the subaudible narrowband signal is determined using an audibility model (Fig. 1; column 4, line 64 to column 5, line 35).

Regarding Claim 6, Miller discloses sending the subaudible narrowband signal comprises sending the subaudible narrowband signal at a level determined by an audibility model, wherein the audibility model has a criterion level, and wherein the level of the subaudible narrowband signal is adjusted so as to be is the criterion level of the audibility model (Fig. 1; column 4, line 64 to column 5, line 35).

Regarding Claim 7, Miller discloses wherein sending the subaudible narrowband signal comprises sending the subaudible narrowband signal at a level determined by an audibility model, wherein the audibility model has a criterion level, and wherein the level of the subaudible narrowband signal is adjusted so as to be is below the criterion level of the audibility model (Fig. 1; column 4, line 64 to column 5, line 35).

Regarding Claim 8, Miller discloses a system for enhancing audio signals, the system comprising: at least one detector to detect undesired feedback in an input signal (Fig. 1; column 3, lines 32-60); at least one notch filter to filter a processed signal, wherein the at least one notch filter provides a filtered signal (21 in Fig. 1; column 4, lines 47-63) and the processed signal is provided by processing the input signal (Fig. 1); and at least one probe generator to generate a probe signal ((f_i , $f_{j,}$ f_k), 22 in Fig. 1, (testing signal)) and the filtered signal used to probe a feedback path with a narrowband

subaudible audio probe signal ((f_i , f_j, f_k) in Fig. 1, (testing signal); see figs. 3, 7-11 and column 4, line 64 to column 5, line 35 and column 7, lines 9-19, abstract).

Regarding Claim 9, Miller discloses the at least one detector determines when the feedback path will be probed (Fig. 1; column 3, lines 32-60).

Regarding Claim 10, Miller discloses the at least one detector determines a range of frequencies at which the feedback path will be probed (Fig. 1; column 3, lines 32-60). 13.

Regarding Claim 11, Miller discloses the at least one detector provides a feedback parameter, and wherein the at least one notch filter is receptive to the feedback parameter from the at least one detector (Fig. 1; column 3, lines 32-60).

Regarding Claim 12, Miller discloses the at least one detector provides a plurality of feedback parameters, and wherein the at least one notch filter is receptive to the plurality of feedback parameters from the at least one detector (Fig. 1; column 3, lines 32-60).

Regarding Claim 13, Miller discloses the at least one notch filter has a first bandwidth, wherein the undesired feedback has a second bandwidth, and wherein the at least one notch filter is configured so as to center the first bandwidth of the at least one notch filter on the second bandwidth of the undesired feedback (Fig. 1; column 3, lines 32-60; column 4, lines 47-63).

Regarding Claim 14, Miller discloses the at least one probe generator has a first bandwidth, wherein the feedback path has a second bandwidth, and wherein the at least one probe generator is configured so as to center the first bandwidth of the at least

one probe generator on the second bandwidth of the feedback path (Fig. 1; column 3, lines 32-60; column 4, line 64 to column 5, line 35).

Regarding Claim 15, Miller discloses the at least one probe generator generates a plurality of signals that are combined to form a probe signal to probe a feedback path (Fig. 1; column 4, line 64 to column 5, line 35).

Regarding Claim 17, Miller discloses a signal processor to provide the processed signal (Fig. 1).

Regarding Claim 18, Miller discloses the signal processor includes a compressive amplifier (Fig. 1; column 3, lines 32-60).

Regarding Claim 20, Miller discloses a filter adjuster to adjust a filter by providing a set of filter coefficients (Fig. 3; column 7, lines 9-19).

Regarding Claim 22, Miller discloses an inhibiting filter receptive to the set of filter coefficients from the filter adjuster to inhibit at least one feedback component of the input signal (Fig. 3; column 7, lines 9-19).

Claim 25 is essentially similar to Claim 8 and is rejected for the reasons stated above apropos to Claim 8 (Fig. 1; column 4, line 64 to column 5, line 35).

Regarding Claim 28, Miller discloses the signal generator is a sinusoidal generator (Fig. 1; column 4, line 64 to column 5, line 35).

Regarding Claim 29, Miller discloses the signal generator is a narrowband noise generator (Fig. 1; column 4, line 64 to column 5, line 35).

Regarding Claim 34, Miller discloses the frequency signal is a constant value (Fig. 1; column 4, line 64 to column 5, line 35).

Claim 36 is essentially similar to Claims 8, 22, and 25 and is rejected for the reasons stated above apropos to Claims 8, 22, and 25.

Regarding Claim 40, Miller discloses a filter adjuster (64 in fig.3) to adjust an inhibiting filter (62 in fig.3) to inhibit the undesired feedback by providing a set of filter coefficients, the filter adjuster comprising: a modeler receptive to a feedback indicator parameter, the input signal, and an output signal to model at least one response of the feedback path when the feedback path is probed with the narrowband subaudible audio probe signal at a predetermined frequency ((f_i , f_j, f_k), 22 in Fig. 1, (testing signal)), wherein the modeler provides at least one sample that is representative of the at least one response of the feedback path (Figs. 1,3 and 7-11; column 4, line 64 to column 5, line 35 and abstract).

3. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6496581 to Finn et al (hereafter as Finn) in view of U.S. Patent No. 5,506,910 to Miller. [It is noted that Miller is now sprovided as directly corresponding evidence to support the prior common knowledge finding / Official Notice.]

Regarding Claim 1, Finn discloses a method of processing audio signals (Fig. 8), comprising inhibiting at least one feedback component of an input audio signal by adjusting a feedback-inhibiting filter (432,402 in Fig. 8; column 15, lines 17-36) using a narrowband probe signal (400,430). Finn does not expressly disclose the narrowband probe signal being subaudible.

However, it is well known in the art to have a narrowband probe signal be subaudible in order to reduce undesired signals heard by the user. One example is provided by Miller (abstract, col. 2, lines 13-18 and 46-58, col. 7, lines 9-20, col. 10, lines 12-17, fig. 1, 3, 4).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify Finn to provide a subaudible narrowband probe signal in order to reduce undesired signals heard by the user (Miller, col. 10, lines 12-17).

Regarding Claim 2, Finn discloses a method of processing at least one audio signal (Fig. 7) comprising: filtering a processed signal by a notch filter to form a filtered signal (column 2, lines 36-53; column 14, line 4 to column 15, line 3). Finn does not expressly disclose sending a subaudible narrowband signal having a first bandwidth into the filter signal to form a probe signal to probe a feedback path having a second bandwidth.

Finn further discloses an acoustic feedback tonal canceler is provided, removing tonal noise from the output of the microphone to prevent broadcast thereof by a remote but acoustically coupled loudspeaker. Feedback tonal canceler (390,420) includes a summer (392,422) having an input (394,424) from microphone (36,38), an input (396,436) from feedback detector (398,428) and tone generator (400,430) supplied through adaptive filter model (402,432) (i.e. sending a narrowband signal having a first bandwidth into the filter signal to form a probe signal to probe a feedback path having a second bandwidth)(Fig. 8), and an output (404,434) to loudspeaker (34,32) through

summer (90,106). Model (402,432) has a model input (406,436) from tone generator (400,430), a model output (408,438) supplying a correction signal to summer input (396,426), and an error input (410,440) from summer output (404,434) (Fig. 8; column 2, lines 54- 57; column 15, lines 4-36).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Finn with the teaching of Finn to incorporate an acoustic feedback tonal canceler in order to removing tonal noise from the output of the microphone to prevent broadcast thereof by a remote but acoustically Coupled loudspeaker.

Therefore, Finn as modified includes a summer (392,422) having an input from the adjustable notch filter (356,376), wherein the adjustable notch filter has filtered the output of the microphone (36,38), an input (396,436) from feedback detector (350,370) and tone generator (400,430) supplied through adaptive filter model (402,432), wherein the feedback detect (350,370) has an input (352,372) from the microphone (36,38), and an output (354,374) controlling the adjustable notch filter (356,376) filtering the output of the microphone (36,38) supplied to loudspeaker (34,32), and an output (404,434) to loudspeaker (34,32) through summer (90,106). Model (402,432) has a model input (406,436) from tone generator (400,430), a model output (408,438) supplying a correction signal to summer input (396,426), and an error input (410,440) from summer output (404,434). Finn as modified does not expressly disclose the narrowband signal being subaudible.

However, it is well known in the art to have a narrowband probe signal be subaudible in order to reduce undesired signals heard by the user. One example is provided by Miller (abstract, col. 2, lines 13-18 and 46-58, col. 7, lines 9-20, col. 10, lines 12-17, fig. 1, 3, 4).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to further modify Finn as modified to provide a subaudible narrowband probe signal in order to reduce undesired signals heard by the user (Miller, col. 10, lines 12-17).

Regarding Claim 3, Finn as modified comparing the probe signal to an input signal and adjusting selectively an inhibiting filter so as to inhibit at least one audio artifact associated with the feedback path (Fig. 8; column 15, lines 4- 16).

Regarding Claim 4, Finn as modified discloses turning off selectively the operation of the notch filter when the inhibiting filter is adjusted (column 14, lines 4-49).

Regarding Claim 5, Finn as modified discloses sending the subaudible narrowband signal comprises sending the subaudible narrowband signal having a level, wherein the level of the subaudible narrowband signal is determined using an audibility model (i.e. it is inherent the tone generator generates a tone with a level)(Figs. 7 and 8).

Regarding Claim 6, Finn as modified does not expressly disclose sending the subaudible narrowband signal comprises sending the subaudible narrowband signal at a level determined by an audibility model, wherein the audibility model has a criterion level, and wherein the level of the subaudible narrowband signal is adjusted so as to be is the criterion level of the audibility model. Finn further discloses a training noise to be

imperceptible by the occupant yet have a sufficient signal to noise ratio for accurate model convergence (column 2, lines 7-14; column 10, lines 22-38).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify Finn as modified with the teaching of Finn to have the tone generator to generate a tone signal, which have a sufficient signal to noise ratio for accurate model convergence.

Regarding Claim 7, Finn as modified discloses wherein sending the subaudible narrowband signal comprises sending the subaudible narrowband signal at a level determined by an audibility model, wherein the audibility model has a criterion level, and wherein the level of the subaudible narrowband signal is adjusted so as to be is below the criterion level of the audibility model (column 10, lines 54-67).

4. Claims 8-23, 25, 28-29, 34, 36, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6496581 to Finn in view of U.S. Patent No. 5677987 to Seki et al (hereafter as Seki) and U.S. Patent No. 5,506,910 to Miller. [It is noted that Miller is now provided as directly corresponding evidence to support the prior common knowledge finding / Official Notice.]

Regarding Claim 8, Finn discloses a system for enhancing audio signals, the system (Fig. 7) comprising: at least one detector to detect undesired feedback in an input signal (350,370); at least one notch filter, wherein the at least one notch filter provides a filtered signal (Fig. 7; column 14, lines 4-67). Finn does not expressly

disclose a processed signal wherein the processed signal is provided by processing the input signal.

Seki discloses a compressor/limiter for limiting the amplitude an input signal in order to avoid damaging equipment such as speaker (Fig. 16; column 4, lines 10-21).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate a compressor/limiter for limiting the amplitude the input signal in order to avoid damaging equipment such as speaker (i.e. a processed signal wherein the processed signal is provided by processing the input signal, therefore the at least one notch filter filters the processed signal).

Finn does not expressly disclose at least one probe generator to generate a probe signal and the filtered signal used to probe a feedback path with a narrowband audio probe signal.

Finn further discloses an acoustic feedback tonal canceller is provided, removing tonal noise from the output of the microphone to prevent broadcast thereof by a remote but acoustically coupled loudspeaker. Feedback tonal canceller (390,420) includes a summer (392,422) having an input (394,424) from microphone (36,38), an input (396,436) from feedback detector (398,428) and tone generator (400,430) supplied through adaptive filter model (402,432) (i.e. at least one probe generator to' generate a probe signal and the filtered signal used to probe a feedback path with a narrowband audio probe signal)(Fig. 8), and an output (404,434) to loudspeaker (34,32)through summer (90,106). Model (402,432) has a model input (406,436) from tone generator (400,430), a model output (408,438) supplying a correction signal to summer input

(396,426), and an error input (410,440) from summer output (404,434) (Fig. 8; column 2, lines 54-57; column 15, lines 4-36).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Finn with the teaching of Finn to incorporate an acoustic feedback tonal canceller in order to removing tonal noise from the output of the microphone to prevent broadcast thereof by a remote but acoustically coupled loudspeaker.

Therefore, Finn as modified includes a summer (392,422) having an input from the adjustable notch filter (356,376), wherein the adjustable notch filter has filtered the output of the microphone (36,38), an input (396,436) from feedback detector (350,370) and tone generator (400,430) supplied through adaptive filter model (402,432), wherein the feedback detect (350,370) has an input (352,372) from the microphone (36,38), and an output (354,374) controlling the adjustable notch filter (356,376) filtering the output of the microphone (36,38) supplied to loudspeaker (34,32), and an output (404,434) to loudspeaker (34,32) through summer (90,106). Model (402,432) has a model input (406,436) from tone generator (400,430), a model output (408,438) supplying a correction signal to summer input (396,426), and an error input (410,440) from summer output (404,434).

Finn as modified does not expressly the narrowband audio probe signal being subaudible.

However, it is well known in the art to have a narrowband probe signal be subaudible in order to reduce undesired signals heard by the user. One example is

provided by Miller (abstract, col. 2, lines 13-18 and 46-58, col. 7, lines 9-20, col. 10, lines 12-17, fig. 1, 3, 4).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to further modify Finn as modified to provide a subaudible narrowband probe signal in order to reduce undesired signals heard by the user (Miller, col. 10, lines 12-17).

Regarding Claim 9, Finn as modified discloses the at least one detector determines when the feedback path will be probed (column 14, lines 4-49; column 15, lines 4-16).

Regarding Claim 10, Finn as modified discloses the at least one detector determines a range of frequencies at which the feedback path will be probed (column 14, lines 4-49; column 15, lines 4-16).

Regarding Claim 11, Finn as modified discloses the at least one detector provides a feedback parameter, and wherein the at least one notch filter is receptive to the feedback parameter from the at least one detector (Fig 7; column 14, lines 4-49; column 15, lines 4-16).

Regarding Claim 12, Finn as modified discloses the at least one detector provides a plurality of feedback parameters, and wherein the at least one notch filter is receptive to the plurality of feedback parameters from the at least one detector (column 14, lines 4-49).

Regarding Claim 13, Finn as modified discloses the at least one notch filter has a first bandwidth, wherein the undesired feedback has a second bandwidth, and wherein

the at least one notch filter is configured so as to center the first bandwidth of the at least one notch filter on the second bandwidth of the undesired feedback (Fig. 7; column 14, lines 4-67).

Regarding Claim 14, Finn as modified discloses the at least one probe generator has a first bandwidth, wherein the feedback path has a second bandwidth, and wherein the at least one probe generator is configured so as to center the first bandwidth of the at least one probe generator on the second bandwidth of the feedback path (column 15, lines 4-36).

Regarding Claim 15, Finn as modified discloses a sine ware or multiple sine waves can be generated (i.e. the at least one probe generator generates a plurality of signals)(column 15, lines 4-16), but does not expressly disclose the plurality of signals are combined to form a probe signal to probe a feedback path.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made that when multiple sine waves are generated the multiple sine waves would be combined at a summer as taught by Finn in Fig. 5 to produce a probe signal.

All elements of Claim 16 are comprehended by Claim 8. Claim 16 is rejected for the reasons stated above apropos to Claim 8.

All elements of Claim 17 are comprehended by Claim 8. Claim 17 is rejected for the reasons stated above apropos to Claim 8.

All elements of Claim 18 are comprehended by Claim 8. Claim 18 is rejected for the reasons stated above apropos to Claim 8.

Regarding Claim 19, Finn as modified discloses once the filter has been applied, the observation of the acoustic feedback should vanish, however hysteresis in the measurement process should be applied to not encourage cycling of the feedback reduction. Long term statistics of the feedback treatment process can be utilized for determining if the notch filter could be removed from the communication channel (column 14, lines 4-49), but does not expressly disclose a switch to provide an output signal, wherein the switch is receptive to the processed signal and a combined signal, wherein the combined signal includes a combination of the probe signal and the filtered signal.

However, the Examiner take Official Notice that it is well known to provide a switch to turn on/off the feedback reduction or switch between normal mode and feedback reduction when the detector determines that it is not necessary for feedback reduction which will remove the notch filter and sine wave or multiple sine waves (i.e. probe signal) from the communication channel when the switch is turned off or in normal mode in order to reduce processing to occur when it is not necessary.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Finn as modified to incorporate a switch to provide the flexible to remove the notch filter and sine wave or multiple sine waves (i.e. probe signal) from the communication channel when the switch is turned off or in normal mode in order to reduce processing to occur when it is not necessary.

Therefore, Finn as modified would have provided a switch receptive to the processed signal and a combined signal, wherein the combined signal includes a combination of the probe signal and the filtered signal.

Regarding Claim 20, Finn as modified discloses a filter adjust a filter by providing a set of filter coefficients (Fig. 8; column 15, lines 4-16).

Regarding Claim 21, Finn as modified discloses the filter adjuster is configured to compare the input signal and an output signal to determine amplitude and phase responses of the feedback path, wherein the output signal includes a combination of the probe signal and the filtered signal (column 4, lines 48-67; column 15, lines 4-16).

Regarding Claim 22, Finn as modified discloses an inhibiting filter receptive to the set of filter coefficients from the filter adjuster to inhibit at least one feedback component of the input signal (column 15, lines 4-14).

Regarding Claim 23, Finn as modified discloses the inhibiting filter approximates the response of the feedback path to provide at least one feedback component signal, wherein the at least one feedback component signal is subtracted from the input signal (Figs. 7 and 8).

Claim 25 is essentially similar to Claim 8 and is rejected for the reasons stated above apropos to Claim 8 (Figs. 7 and 8; column 15, lines 4-36).

Regarding Claim 28, Finn as modified discloses the signal generator is a sinusoidal generator (Fig. 8; column 15, lines 4-16).

Regarding Claim 29, Finn as modified discloses the signal generator is a narrowband noise generator (Fig. 8; column 15, lines 4-16).

Regarding Claim 34, Finn as modified discloses the frequency signal is a constant value (Fig. 8; column 15, lines 4-16).

Claim 36 is essentially similar to Claims 8, 22, and 25 and is rejected for the reasons stated above apropos to Claims 8, 22, and 25.

Regarding Claim 40, Finn as modified discloses a filter adjuster to adjust an inhibiting filter to inhibit the undesired feedback by providing a set of filter coefficients, the filter adjuster comprising: a modeler receptive to a feedback indicator parameter, the input signal, and an output signal to model at least one response of the feedback path when the feedback path is probed with the narrowband subaudible audio probe signal at a predetermined frequency, wherein the modeler provides at least one sample that is representative of the at least one response of the feedback path (Figs. 7 and 8; column 15, lines 4-36).

5. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 20020044667 to Stott et al (hereafter as Stott) in view of Patent No. 5,506,910 to Miller. [It is noted that Miller is now provided as directly corresponding evidence to support the prior common knowledge finding / Official Notice.]

Regarding Claim 1, Stott discloses a method of processing audio signals (Fig. 7), comprising inhibiting at least one feedback component of an input audio signal by adjusting a feedback-inhibiting filter (76 in Fig. 7; page 3, paragraph 0047- 0053) using

a narrowband probe signal (70) (abstract; Fig. 7). Stott does not expressly disclose the narrowband probe signal being subaudible.

However, it is well known in the art to have a narrowband probe signal be subaudible in order to reduce undesired signals heard by the user. One example is provided by Miller (abstract, col. 2, lines 13-18 and 46-58, col. 7, lines 9-20, col. 10, lines 12-17, fig. 1, 3, 4).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify Stott to provide a subaudible narrowband probe signal in order to reduce undesired signals heard by the user (Miller, col. 10, lines 12-17).

(10) Response to Argument

Regarding the rejection of claim 1 under 35 USC § 102(e) as being anticipated by Kandel (US 6,353,671) (Issue C, pages 11-13):

Appellant alleged that Kandel does not teach adjusting a feedback- inhibiting filter using a narrowband subaudible probe signal (Argument, page 12, second paragraph).

The examiner respectfully disagrees. Kandel discloses a adjusting (such as, by processing filter 120 accurate the input signal (T tong signal plus the audio signal) from microphone 118 and output to mixer 113 when the T tong frequency changing) a feedback-inhibiting filter (120 in Fig. 4; column 5, line 57 to column 6, line 5; column 9, lines 50-57) using a narrowband subaudible probe signal (reads on the T tong signal, in

Fig. 4; column 6, lines 19-24; column 10, lines 12-25; column 12, lines 1- 4). It meets the limitation as recited in claim 1.

Regarding the rejection of claims 1-2, 5-15, 17, 18, 20, 22, 25, 28, 29, 34, 36 and 40 under 35 U.S.C. § 102(b) as being anticipated by Miller et al. (US 5,506,910) (Issue D, starting on page 13):

Appellant alleged that Miller does not teach or suggest adjusting a feedback-inhibiting filter using a narrowband subaudible probe signal of claim 1 (Argument, page 14, 4th paragraph).

The examiner respectfully disagrees. Miller discloses a method of processing audio signals, comprising inhibiting at least one feedback component of an input audio signal by adjusting a feedback-inhibiting filter (62 in Fig. 3; column 7, lines 9-19) using a narrowband subaudible probe signal ((f_i, f_j, f_k , testing signal) in Fig. 1 and see figs 7-11; column 4, line 64 to column 5, line 35, abstract). Regarding Figure 3, at column 7, lines, 12-16, Miller, recites: The feedback eliminator 62 monitors the program signal from the mixer 24, identifies any frequencies which become loud because of acoustic feedback, and attenuates identified howl frequencies to eliminate the acoustic feedback.

As to the argument that Miller does not teach each and every claim element of claim 1, the examiner respectfully disagrees, claim 1 recites "a method of processing audio signals, comprising inhibiting at least one feedback component of an input audio signal by adjusting a feed back-inhibiting filter using a narrowband subaudible probe signal", but does not clearly specify in the claim how the narrowband subaudible probe signal is utilize to inhibit at least one feedback component, which the examiner can

interpret broadly in a manner consistent with the specification. Miller discloses the incoming program signal may be monitored for magnitude of a broadcast reference signal within an appropriate time window and/or compared to the frequency component magnitude before and/or after broadcast of the reference signal. Where the amplification system includes program material input from microphones, acoustic feedback of the broadcast reference signal can affect the overall transfer response. Monitoring the incoming program signal for acoustic feedback of the reference signal in the program signal enables the automatic equalizer to make an appropriate adjustment when necessary. The feedback eliminator 62 is a unit, circuit, or algorithm which eliminates unwanted acoustic feedback, sometimes called howl. An example of a suitable feedback eliminator is disclosed in U.S Pat. No. 5,245,665. The feedback eliminator 62 monitors the program signal from the mixer 24, identifies any frequencies which become loud because of acoustic feedback, and attenuates identified howl frequencies to eliminate the acoustic feedback. When the automatic equalizer is digital, both equalizer 20 and feedback eliminator 62 can be formed by algorithm(s) in the same microprocessor or DSP. It is implicit that the narrowband reference signals generated in automatic equalizer is provided to the input of the feedback eliminator, as shown in Fig. 3, which the signals from the feedback eliminator is fed to power amplifiers in which speakers 36 broadcast the signal from power amplifiers 34. A microphone 40 to pick up the audio program, wherein the signal from the microphone is utilizes to make adjustments in the automatic equalizer. See Figs. 1 and 3; column 6, line 29 to column 7, line 20; column 11, lines 12-37. Therefore, Miller meets claim 1 as recited.

Appellant alleged that Miller does not teach each and every claim element of claim 2 and that Miller does not teach each and every claim element arranged as in claim 2 (see Argument, page 15, 3rd paragraph).

The examiner respectfully disagrees. Miller discloses a method of processing at least one audio signal comprising: filtering a processed signal by a notch filter to form a filtered Signal (21 in Fig. 1; column 4, lines 47-63); and sending a subaudible narrowband signal ((f_i, f_j, f_k) in Fig. 1) having a first bandwidth into the filter signal to form a probe signal ((f_i, f_j, f_k) in Fig. 1, (testing signal)) to probe a feedback path (between 60 and 36 in fig. 3) having a second bandwidth (Figs. 1, 3 and 7-11; column 4, line 64 to column 5, line 35 and column 7, lines 9-19). Further, Miller discloses the incoming program signal may be monitored for magnitude of a broadcast reference signal within an appropriate time window and/or compared to the frequency component magnitude before and/or after broadcast of the reference signal. Where the amplification system includes program material input from microphones, acoustic feedback of the broadcast reference signal can affect the overall transfer response. Monitoring the incoming program signal for acoustic feedback of the reference signal in the program signal enables the automatic equalizer to make an appropriate adjustment when necessary. The feedback eliminator 62 is a unit, circuit, or algorithm which eliminates unwanted acoustic feedback, sometimes called howl. An example of a suitable feedback eliminator is disclosed in U.S Pat. No. 5,245,665. The feedback eliminator 62 monitors the program signal from the mixer 24, identifies any frequencies which become loud because of acoustic feedback, and attenuates identified howl

frequencies to eliminate the acoustic feedback. When the automatic equalizer is digital, both equalizer 20 and feedback eliminator 62 can be formed by algorithm(s) in the same microprocessor or DSP. It is implicit that the narrowband reference signals generated in automatic equalizer is provided to the input of the feedback eliminator, as shown in Fig. 3, which the signals from the feedback eliminator is fed to power amplifiers in which speakers 36 broadcast the signal from power amplifiers 34. A microphone 40 to pick up the audio program, wherein the signal from the microphone is utilizes to make adjustments in the automatic equalizer. See Figs. 1 and 3; column 6, line 29 to column 7, line 20; column 11, lines 12-37. Therefore, Miller meets claim 2 as recited.

Appellant alleged that Miller does not teach each and every claim element of claim 8 (see Argument, page 16, 3rd paragraph).

The examiner's response is that Miller discloses a system for enhancing audio signals, the system comprising: at least one detector to detect undesired feedback in an input signal (Fig. 1; column 3, lines 32-60); at least one notch filter to filter a processed signal, wherein the at least one notch filter provides a filtered signal (21 in Fig. 1; column 4, lines 47-63) and the processed signal is provided by processing the input signal (Fig. 1); and at least one probe generator to generate a probe signal ((f_i , $f_{j,}$ f_k), 22 in Fig. 1, (testing signal)) and the filtered signal used to probe a feedback path with a narrowband subaudible audio probe signal ((f_i , $f_{j,}$ f_k) in Fig. 1, (testing signal); see figs. 3, 7-11 and column 4, line 64 to column 5, line 35 and column 7, lines 9-19, abstract). Miller further discloses that a system is configured to probe a feedback path with a narrowband subaudible probe signal (see Figs. 1 and 3-4, 7-11; column 6, lines 30-61,

abstract). Further, Miller discloses the incoming program signal may be monitored for magnitude of a broadcast reference signal within an appropriate time window and/or compared to the frequency component magnitude before and/or after broadcast of the reference signal. Where the amplification system includes program material input from microphones, acoustic feedback of the broadcast reference signal can affect the overall transfer response. Monitoring the incoming program signal for acoustic feedback of the reference signal in the program signal enables the automatic equalizer to make an appropriate adjustment when necessary. The feedback eliminator 62 is a unit, circuit, or algorithm which eliminates unwanted acoustic feedback, sometimes called howl. An example of a suitable feedback eliminator is disclosed in U.S Pat. No. 5,245,665. The feedback eliminator 62 monitors the program signal from the mixer 24, identifies any frequencies which become loud because of acoustic feedback, and attenuates identified howl frequencies to eliminate the acoustic feedback. When the automatic equalizer is digital, both equalizer 20 and feedback eliminator 62 can be formed by algorithm(s) in the same microprocessor or DSP. It is implicit that the narrowband reference signals generated in automatic equalizer is provided to the input of the feedback eliminator, as shown in Fig. 3, which the signals from the feedback eliminator is fed to power amplifiers in which speakers 36 broadcast the signal from power amplifiers 34. A microphone 40 to pick up the audio program, wherein the signal from the microphone is utilizes to make adjustments in the automatic equalizer. See Figs. 1 and 3; column 6, line 29 to column 7, line 20; column 11, lines 12-37. Therefore, Miller meets claim 8 as recited.

Appellant alleged that Miller does not teach each and every claim element as arranged in claim 40 (see Argument, page 17, 3rd paragraph).

The examiner's response is that Miller discloses a filter adjuster (64 in fig.3) to adjust an inhibiting filter (62 in fig.3) to inhibit the undesired feedback by providing a set of filter coefficients, the filter adjuster comprising: a modeler receptive to a feedback indicator parameter, the input signal, and an output signal to model at least one response of the feedback path when the feedback path is probed with the narrowband subaudible audio probe signal at a predetermined frequency ((f_i, f_j, f_k), 22 in Fig. 1, (testing signal)), wherein the modeler provides at least one sample that is representative of the at least one response of the feedback path (Figs. 1, 3 and 7-11; column 4, line 64 to column 5, line 35; abstract). See response to the arguments regarding claims 1, 2 and 8 above.

Regarding the rejection of claims 1-7 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6496581 to Finn (Issue E, starting from page 17): [It is noted that Miller is now provided as directly corresponding evidence to support the prior common knowledge finding / Official Notice.]

Appellant alleged that Finn does not teach or suggest a subaudible narrowband probe signal used to adjust an inhibiting filter as recited in claim 1. (Argument, page 18, first paragraph).

The examiner's response is that USPN 5506910 to Miller et al discloses a narrow band short duration low magnitude tones inserted into program signals being broadcast without distorting or producing any noticeable effect on the broadcast program (Figs. 1

and 3-4; column 2, lines 46-58). Further, the system of Finn operates in a similar manner to Appellant's invention to suppression feedback of the input signal. It is implicit that the tone generator of Finn as modified generates a narrowband tone signal, therefore Finn as modified discloses using a narrowband tone signal.

With respect to Appellant's argument on page 19 that Finn does not teach or suggest forming a probe signal as recited in claim 2, Finn as modified discloses tone generator which provides a narrowband tone signal, and it is implicit that the narrowband tone signal has a first bandwidth, wherein the narrowband tone signal is send into a filtered signal, see Fig. 8.

Regarding the rejection of claims 8-23, 25, 28-29, 34, 36, and 40 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6496581 to Finn in view of U.S. Patent No. 5677987 to Seki et al (Issue F, pages 19-21): [It is noted that Miller is now provided as directly corresponding evidence to support the prior common knowledge finding / Official Notice.]

With respect to Appellant's argument on pages 19-20, stating that "Appellant cannot find in the combination of Finn and Seki et al (hereafter Seki), as proffered in the Office Action, a teaching or a suggestion of a system that includes a probe generator to generate a probe signal to probe a feedback path with a narrowband subaudible audio probe signal", The examiner's response is that Finn does not expressly disclose a processed signal wherein the processed signal is provided by processing the input signal. Seki discloses a compressor/limiter for limiting the amplitude an input signal in order to avoid damaging equipment such as speaker (Fig. 16; column 4, lines 10-21). It

is the combination that meets the claimed limitation. Further, the system of Finn operates in a similar manner to Appellant's invention to suppression feedback of the input signal. It is implicit that the tone generator of Finn as modified generates a narrowband tone signal, therefore Finn as modified discloses using a narrowband tone signal.

Regarding the rejection of claim 1 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 20020044667 to Stott et al (Issue G, pages 22-23): [It is noted that Miller is now provided as directly corresponding evidence to support the prior common knowledge finding / Official Notice.]

With respect to appellant's argument that Stott does not disclose a narrowband subaudible probe signal, Miller et al discloses a narrow band short duration low magnitude tones inserted into program signals being broadcast without distorting or producing any noticeable effect on the broadcast program (Figs. 1 and 3-4; column 2, lines 46-58). It is the combination that meets the claimed limitation. Further, the system of Finn operates in a similar manner to Appellant's invention to suppression feedback of the input signal. It is implicit that the tone generator of Finn as modified generates a narrowband tone signal, therefore Finn as modified discloses using a narrowband tone signal.

For the reasons above, it is believed that the rejections should be sustained.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

Respectfully submitted,

Lun-See Lao
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Art Unit 2615

October 27, 2007

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